

MATH. 104A, SAMPLE MIDTERM

You have **50 minutes** for this exam. Please write legibly. **No calculators are allowed.**

(1a) (2 points) Give the definition of a prime number.

(b) (5 points) Show that if $n > 1$ is composite, then n has a prime divisor which is $\leq \sqrt{n}$.

(c) (2 points) Show that 137 is prime.

(2a) (6 points) Use Euclid's algorithm to find $\gcd(221, 289)$.

(b) (6 points) Find all integer solutions to

$$221x + 289y = 153.$$

(3) Are the following true or false? Prove your assertion.

(a) (3 points) If a , b and c are 3 non-zero integers, then $\gcd(a, b, c) = \gcd(a, \gcd(b, c))$.

(b) (3 points) If a^2 and b^2 are relatively prime, so are a and b .

(c) (3 points) $\sqrt[5]{6}$ is irrational.